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The Efficacy of Blue-Green Infrastructure for Pluvial Flood Prevention under Conditions of Deep Uncertainty

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Urban areas around the world are growing in size and importance; however, cities experience elevated risks of pluvial flooding due to the prevalence of impermeable land surfaces within them. Urban planners and engineers encounter a great deal of uncertainty when planning adaptations to these flood risks, due to the interaction of multiple factors such as climate change and land use change. This leads to conditions of deep uncertainty.

Blue-Green (BG) solutions utilise natural vegetation and processes to absorb and retain runoff while providing a host of other social, economic and environmental services. When utilised in conjunction with Decision Making under Deep Uncertainty (DMDU) methodologies, BG infrastructure provides a flexible and adaptable method of "no-regret" adaptation; resulting in a practical, economically efficient, and socially acceptable solution for flood risk mitigation.

This work presents the methodology for analysing the impact of BG infrastructure in the context of the Adaptation Tipping Points approach to protect against pluvial flood risk in an iterative manner. An economic analysis of the adaptation pathways is also conducted in order to better inform decision-makers on the benefits and costs of the adaptation options presented. The methodology was applied to a case study in the Cranbrook Catchment in the North East of London. Our results show that BG infrastructure performs better under conditions of uncertainty than traditional grey infrastructure.